CLAIMS

1. A process for improving the efficiency of a fuel cell system that includes a fuel cell having an anode and a cathode and is designed for full power operation at a certain current density, a liquid coolant flowing through said fuel cell, a heat exchanger for extracting heat from said coolant, and a pump energized by said fuel cell for pumping said coolant between said fuel cell and said heat exchanger, said process comprising the steps of: supplying fuel to said anode; supplying oxidant to said cathode; drawing current from said fuel cell at a current density less then 25% of said full power current density; while drawing said current, discontinuing said pumping for an interval of time; allowing the temperature of said fuel cell to rise during said interval to a temperature that does not degrade the performance of said fuel cell; and starting said pumping at the end of said interval; whereby the efficiency of said system is increased by eliminating the parasitic load of said pump on said system during said interval.

2. A process for improving the efficiency of a fuel cell system including a PEM fuel cell having an anode and a cathode and is designed for full power operation at a certain current density, a liquid coolant flowing through said fuel cell, a heat exchanger for extracting heat from said coolant, and a pump energized by said fuel cell for pumping said coolant between said fuel cell and said heat exchanger, said process comprising the steps of: supplying fuel to said anode; supplying oxidant to said cathode; drawing current from said fuel cell at a current density less then about 0.2 A/cm^2; while drawing said current, discontinuing said pumping for an interval of time; allowing the temperature of said fuel cell to rise during said interval; to a temperature that does not degrade the performance of said fuel cell; and starting said pumping at the end of said interval; whereby the efficiency of

said system is increased by eliminating the parasitic load of said pump on said system during said interval.

3. A process according to claim 2 wherein said temperature is allowed to rise to a predetermined first temperature, and said starting of said pumping commences when said first temperature is reached.

4. A process according to claim 3 wherein said first temperature is the temperature of the oxidant exiting the cathode.

5. A process according to claim 3 wherein said first temperature is the temperature of said fuel exiting said anode.

6. A process according to claim 2 wherein said interval has a preset duration.

7. A process according to claim 2 wherein said discontinuing of said pumping commences when the temperature of the oxidant exiting the cathode is within about 2 degrees of the temperature of the coolant exiting the fuel cell.

8. A process according to claim 2 wherein said discontinuing of said pumping commences when the temperature of the fuel exiting the anode is within about 2 degrees of the temperature of the coolant exiting the fuel cell.

9. A process according to claim 2 including the steps of monitoring said current and adjusting the duration of said interval upwardly when the current drawn from said fuel cell is such as to yield a low current density remote from said 0.2 A/cm^2 and downwardly when the current

drawn from said fuel cell is such as to yield high current density near said 0.2 A/cm^2.

10. A process for improving the efficiency of a fuel cell system that includes a fuel cell having an anode and a cathode and is designed for full power operation at a certain current density, a liquid coolant flowing through said fuel cell, a heat exchanger for extracting heat from said coolant, a motor-driven fan energized by said fuel cell for blowing air through said heat exchanger, and a pump energized by said fuel cell for pumping said coolant between said fuel cell and said heat exchanger, said process comprising the steps of: supplying fuel to said anode; supplying oxidant to said cathode; drawing current from said fuel cell at a current density less then 25% of said full power current density; while drawing said current, shutting off said pump and said motor-driven fan for an interval of time; allowing the temperature of said fuel cell to rise during said interval to a temperature that does not degrade the performance of said fuel cell; and starting said pumping at the end of said interval; whereby the efficiency of said system is increased by eliminating the parasitic load of said pump and said fan on said system during said interval.